

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Inquiry Concerning Deployment of Advanced	)	WC Docket No. 17-199
Telecommunications Capability to All	)	
Americans in a Reasonable and Timely	)	
Fashion	)	

**REPLY COMMENTS OF DR. TIMOTHY J. TARDIFF**

The Federal Communications Commission’s (FCC) Notice of Proposed Rulemaking (NPRM) in this proceeding “seek[s] objective data and other evidence reflecting the state of broadband deployment and availability.”<sup>1</sup> I have addressed this issue and other issues in two recently published articles that analyzed trends in the availability of competitive broadband alternatives.<sup>2</sup> Attachment A updates the analysis in the published articles to include the FCC’s most recent (June 2016) fixed broadband deployment and comments on Dr. David Evans’ report (submitted with the Comments of INCOMPAS) alleging a lack of competition for wired Internet access services. My updated analysis corroborates the conclusion in my previous articles that the apparent insufficiencies in competitive alternatives the FCC had used to justify increased regulation have been ameliorated in fairly short order by new offerings by multiple Internet service providers, thus rendering *ex ante* rules based on common carrier regulation superfluous, at best, and counterproductive to competition and innovation, at worst. My qualifications are described in Attachment B: my resume.

Timothy J. Tardiff  
October 6, 2017

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<sup>1</sup> Federal Communications Commission, *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion*, GN Docket No. 17-199, Thirteenth Section 706 Report Notice of Inquiry, August 8, 2017, available at [https://apps.fcc.gov/edocs\\_public/attachmatch/FCC-17-109A1.pdf](https://apps.fcc.gov/edocs_public/attachmatch/FCC-17-109A1.pdf).

<sup>2</sup> Timothy J. Tardiff, “Economic Evaluation of the Factual Basis for the FCC’s Open Internet Order,” *Criterion Journal on Innovation*, Vol. 1, 2016, pp. 479-495, available at <https://www.criterioninnovation.com/articles/tardiff-fcc-open-internet-order.pdf> and Timothy J. Tardiff, “Net Neutrality: Economic Evaluation of Market Developments,” *Journal of Competition Law & Economics*, Vol. 11, No. 3, 2015, pp. 701-725, available at <http://aacg.com/empirical-evidence-on-justification-for-net-neutrality/>.

## **Progress in the Provision of and Competition for Wired Broadband Services: Implications for the Federal Communications Commission's Broadband Progress Report**

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### **Introduction**

The Comments from INCOMPAS in this proceeding included a report by Dr. David Evans.<sup>1</sup> In this report, Dr. Evans calculated the proportions of the population living in census blocks with varying numbers of Internet access services providers as of June 2016. Dr. Evans relied on these calculations, as well as the FCC's earlier commentary on broadband availability<sup>2</sup> to conclude that there is a lack of competition among Internet access service providers.<sup>3</sup> However, even though Dr. Evans alludes to earlier FCC results (based on observations from periods prior to June 2016), he neither presents these data nor comments on the development of competition since those earlier periods. In this paper, I compare the most recently available broadband availability data with data from earlier periods in order to provide information on the progress of broadband deployment, which is a fundamental objective of this proceeding: "In response to this *Inquiry*, we seek objective data and other evidence reflecting the state of broadband deployment and availability."<sup>4</sup>

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<sup>1</sup> David S. Evans, "Economic Findings Concerning the State of Competition for Wired Broadband Provision to U.S. Households and Edge Providers," Exhibit A to Comments of INCOMPAS in this proceeding. Available at <https://ecfsapi.fcc.gov/file/1092159216686/FINAL%20706%20Comments%20with%20Evans%20Paper%20Attachment%209.21.17.pdf> ("Evans Report").

<sup>2</sup> Federal Communications Commission, *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act*, GN Docket No. 15-191, 2016 Broadband Progress Report, January 29, 2016, available at [https://apps.fcc.gov/edocs\\_public/attachmatch/FCC-16-6A1.pdf](https://apps.fcc.gov/edocs_public/attachmatch/FCC-16-6A1.pdf) and Federal Communications Commission, *Preserving the Open Internet*, GN Docket No. 09-191, *Broadband Industry Practices*, GN Docket No. 09-191, Report and Order, December 23, 2010, available at [https://apps.fcc.gov/edocs\\_public/attachmatch/FCC-10-201A1\\_Rcd.pdf](https://apps.fcc.gov/edocs_public/attachmatch/FCC-10-201A1_Rcd.pdf) ("2010 Open Internet Order").

<sup>3</sup> Evans Report. p. 64.

<sup>4</sup> Federal Communications Commission, *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion*, GN Docket No. 17-199, Thirteenth Section 706 Report Notice of Inquiry, August 8, 2017, available at [https://apps.fcc.gov/edocs\\_public/attachmatch/FCC-17-109A1.pdf](https://apps.fcc.gov/edocs_public/attachmatch/FCC-17-109A1.pdf).

## Growth in Broadband Competition

Dr. Evans presents his calculations on broadband availability as of June 2016. He reports that “[t]hese figures are generally consistent with findings the FCC has reached using earlier and similar data.”<sup>5</sup> Dr. Evans’ figures and the FCC findings that he represents as comparable appear in Table 1.<sup>6</sup>

**Table 1: June 2016 Broadband Development Compared to Earlier Years**

	(1) Evans	(2) 2016 Broadband Progress Report	(3) 2010 Open Internet Order	(4) 2010 Open Internet Order
Number of Providers				
3 or more	22.5%	38%	28%	2%
2	40.8%		48%	20%
1	29.7%	51%	21%	58%
0	7.0%	10%	3%	21%
Service Date	June 2016	December 2014	December 2009	December 2009
Speed	25 Mbps downstream/3 Mbps upstream	25 Mbps downstream/3 Mbps upstream	3 Mbps downstream/0.768 Mbps upstream	10 Mbps downstream/1.5 Mbps upstream
Granularity	Block	Block	Tract	Tract
Population or Household	Population	Population	Household	Household
Sources:				
Column (1): Evans Report, p. 11, Table 2.				
Column (2): 2016 Broadband Progress Report, p. 38, Table 6.				
Columns (3) and (4): Internet Access Services Report as of December 31, 2009, Figure 3(a).				
Note: The 2016 Broadband Progress Report used a “more than one provider” category.				

<sup>5</sup> Evans Report, p. 11, referring to the results presented in Table 2 on that page.

<sup>6</sup> Dr. Evans cites paragraph 32 of the 2010 Open Internet Order. The data described in that paragraph are from Federal Communications Commission, “Internet Access Services: Status as of December 31, 2009, December 2010, available at [https://apps.fcc.gov/edocs\\_public/attachmatch/DOC-303405A1.pdf](https://apps.fcc.gov/edocs_public/attachmatch/DOC-303405A1.pdf).

The four columns of the table compare Dr. Evans' results (Column 1) with earlier results in the FCC's documents (Columns 2 through 4). Each column reports the proportions of the population (or households) living in census areas (blocks or tracts) with three or more, two, one, or no providers of Internet access at a particular speed level. For example, Dr. Evans reports that as of June 2016, 22.5 percent of the population lived in *census blocks* with 3 or more providers offering Internet access at speeds of at least 25 Mbps downstream and 3 Mbps upstream, 40.8 percent lived in census blocks with two providers, 29.7 percent lived in census blocks with one provider, and 7.0 percent lived in census blocks with no providers. Dr. Evans' calculations used the FCC's Form 477 data and US census data.<sup>7</sup>

The second column has the same interpretation as the first column, except with a service period eighteen months earlier. Comparison of these columns reveals substantial growth in the availability of alternative providers between the end of 2014 and the middle of 2016. For example, the proportion of the population living in census blocks with two or more alternatives increased by more than 25 percentage points from 38 percent to 63.3 percent.<sup>8</sup> The progress in broadband deployment revealed by this comparison suggests that Dr. Evans' "snapshot" of the extent of broadband competition will likely be out-of-date in fairly short order by new offerings by multiple Internet service providers.

Comparisons with the FCC's observations in the 2010 Open Internet Order are even more revealing. While there may be a superficial similarity in the proportions listed in the first column and the third column—broadband availability as of the end of 2009 at 3 Mbps downstream/0.768 Mbps upstream (which approximated the then-current broadband standard of 4 Mbps downstream/1 Mbps upstream), there are major measurement differences that render such comparisons uninformative or misleading.<sup>9</sup> In addition to the slower speeds measured earlier, the older proportions were percentages of households living in *census tracts* with a given number of alternative providers, e.g., as of the end of 2009, 28 percent of households lived in census tracts in which three providers offered service somewhere in their tract (but not necessarily in each block). Indeed, the combination of (1) the faster speed level reported by Dr. Evans and (2) the more stringent census block measurement indicate that there have been substantial progress in broadband deployment.

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<sup>7</sup> My comments in the Restoring Internet Freedom proceeding used Form 477 and US census data to report proportions of *households* living in census blocks with 3 or more, two, one, or no providers. My results were within one percentage point of Dr. Evans'. Since the average number of persons per household varies across census blocks, such small differences are not surprising. Comments of Dr. Timothy J. Tardiff, WC Docket No. 17-108, July 17, 2017, Attachment A, p. 4, Table 2, last column, available at <https://ecfsapi.fcc.gov/file/1071781600866/Tardiff%20Comments%2017-108.pdf>.

<sup>8</sup> The 2016 Broadband Progress Report used a "more than one provider" category.

<sup>9</sup> For biannual service dates from December 2009 through December 2013, the FCC's Internet Access Services Reports consistently measured broadband availability the same way as measured in the last two columns of Table 1. In addition to the two speed levels in those columns, the reports also provided availability at the 3 Mbps downstream/0.2 Mbps upstream and 6 Mbps downstream/1.5 Mbps upstream levels. Starting with the December 2014 service period (there was no report for June 2014), the measurement of broadband availability in the Internet

This progress can be seen by tracing the development of fixed-location broadband availability at the highest reported speed level in the Internet Access Services Reports through service periods to the end of 2013. Table 2 reports these results. In addition to repeating the last column of Table 1, it shows results for service periods ending December 2012<sup>10</sup>—which informed the Notice of Proposed Rulemaking that culminated in the 2015 Open Internet Order, the end of 2013<sup>11</sup>—the service period immediately following, and the service period ending June 2016. Unlike those in Table 1, the definitions in Table 2 are uniform and the figures thus directly comparable.

**Table 2: Broadband Deployment: 10 Mbps Downstream/1.5 Mbps Upstream**

	(1) December 2009	(2) December 2012	(3) December 2013	(4) June 2016
Number of Providers				
3 or more	2.0%	33%	65%	98.8%
2	20.0%	37%	29%	1.1%
1	58.0%	28%	5%	0.1%
0	21.0%	2%	1%	.
Sources:				
Column (1): Internet Access Services Report as of December 31, 2009, Figure 3(a).				
Column (2): Internet Access Services Report as of December 31, 2012, Figure 5(a).				
Column (3): Internet Access Services Report as of December 31, 2013, Figure 5(a).				
Column (4): AACG calculation, based on Form 477 and US Census Data.				

Table 2 reveals substantial growth in the number of alternative providers subsequent to the FCC’s commentary on broadband competition in the 2010 Open Internet Order. That Order relied on data from December 2009 that showed that four-fifths households lived in census tracts with no choice among providers (zero or one provider), while only two percent lived in census tracts with three or more providers. Although Table 2 indicates that there had been substantial progress, the FCC appeared less than enthusiastic about the amount of competition when it initiated the proceeding that produced the 2015 Open Internet Order:<sup>12</sup>

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Access Services Reports changed in three fundamental ways. First, new higher speed levels are reported. Second, availability is measured at the census block, rather than census tract, level. Third, the proportions are percentages of census blocks with availability at the reported speed levels, rather than the percentages of households residing in those census areas. Because consistent measurement of broadband availability is essential to informing policies designed to facilitate broadband deployment and otherwise avoid misleading or uninformative comparisons, my AACG colleagues and I produced reports with consistent measures (including the ones appearing in the earlier reports) when the FCC releases the biannual 477 data. A description of this analysis can be found at <http://aacg.com/litigation/telecommunications/net-neutrality/>.

<sup>10</sup> Federal Communications Commission, “Internet Access Services: Status as of December 31, 2012, December 2013, available at [https://apps.fcc.gov/edocs\\_public/attachmatch/DOC-324884A1.pdf](https://apps.fcc.gov/edocs_public/attachmatch/DOC-324884A1.pdf).

<sup>11</sup> Federal Communications Commission, “Internet Access Services: Status as of December 31, 2013, October 2014, available at [https://transition.fcc.gov/Daily\\_Releases/Daily\\_Business/2014/db1016/DOC-329973A1.pdf](https://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db1016/DOC-329973A1.pdf).

<sup>12</sup> Federal Communications Commission, *Protecting and Promoting the Open Internet*, GN Docket No. 14-28, Notice of Proposed Rulemaking, May 15, 2014, ¶¶ 47-48 (“2014 NPRM”), available at

We also seek comment on the state of competition in broadband Internet access service, and its effect on providers' incentives to limit openness...In the fixed broadband context, we have seen evidence of limited choice between broadband providers in many areas of the country. As the speed threshold increases to 6 Mbps downstream and 1.5 Mbps upstream, the number of households that are located in census tracts with at least three providers that report serving customers at those higher speeds dips down to a mere 34 percent.

This pessimistic assessment notwithstanding, the second column of Table 2 shows that in the three years between 2009 and 2012, the proportion of households living in census tracts with no choice declined from almost 80 percent to 30 percent. Finally, Table 2 shows that the availability of competitive providers continued to grow: by the following year (end of 2013), only six percent of households lived in census tracts with no choice among providers, while almost two thirds of households lived in census tracts with three or more alternative providers (third column). The fourth column shows that by June 2016 virtually everyone lives in census tracts with three or more competitive alternatives.

Finally, while the less stringent measurement at the census tract level produces higher availability proportions than does measurement at the census block level, the most recent proportions for the 10 Mbps/1.5 Mbps are very high, even with the more stringent measure. In particular, as of June 2016, 91.3 percent of households live in census blocks with three or more providers, with only 0.8 percent of households in census with no choice among providers. That is, at a speed level well beyond the FCC's broadband standard of 4 Mbps downstream/1 Mbps upstream that was in effect until early 2015, there is widespread broadband competition.<sup>13</sup>

## Conclusion

Consistent measurement of broadband competition, which is essential for the proper assessment of progress in the deployment of broadband Internet access, demonstrates substantial growth in recent years. This history shows that apparent insufficiencies in competitive alternatives from observing a single "snapshot" have been ameliorated in fairly short order by new offerings by multiple Internet service providers.

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[https://apps.fcc.gov/edocs\\_public/attachmatch/FCC-14-61A1\\_Rcd.pdf](https://apps.fcc.gov/edocs_public/attachmatch/FCC-14-61A1_Rcd.pdf). At the end of 2012, the state of competition at 10 Mbps downstream and 1.5 Mbps upstream was virtually identical to the FCC's description of competition at 6 Mbps downstream and 1.5 Mbps upstream.

<sup>13</sup> In his dissenting opinion from the D.C. Circuit's upholding of the 2015 Open Internet Order, Judge Williams suggested that the FCC had adopted the new standard to create an appearance of a lack of completion and observed that there were "a fairly large number of competitors in most markets, with 74% of American households having access to at least two fixed providers giving speeds greater than 10 Mbps and 88% with at least two fixed providers giving access to service at 3 Mbps." *United States Telecom Ass'n*, 825 F.3d at 750-71 (Williams, J., dissenting).

## **Timothy J. Tardiff, Ph.D.**

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### **Professional Summary**

Dr. Timothy J. Tardiff has more than 30 years of academic and consulting experience. He has participated in numerous legal and regulatory proceedings regarding telecommunications, economics, intellectual property antitrust, and regulation issues. His research consulting, and expert witness experience in telecommunications has addressed pricing and costing issues involving increasingly competitive services, such as wireless and traditional wireline services. This experience has also included extensive examination and economic evaluation of all facets of the costing methodologies used to establish prices in rate-regulated industries—including expert reports and testimonies in a U.S. Department of Transportation proceeding on the reasonableness from an economic perspective of the rates international carriers at Los Angeles International Airport pay for use of terminal space. His work has included the telecommunications, software, transportation, energy, and public utility industries, and he has published extensively in economics, telecommunications, and transportation journals.

Dr. Tardiff is an economic consultant with clients in the telecommunications and regulated utilities industries. From 2006 to 2009, he was a Managing Director at Huron Consulting Group. Prior to joining Huron, Dr. Tardiff served as a vice president in the telecommunication practice at NERA Economic Consulting. During his career, he has served as the director of Marketing Research and senior member of the transportation practice at Charles River Associates, Inc. and assistant professor in the Department of Civil Engineering and Division of Environmental Studies at the University of California, Davis.

Dr. Tardiff's research has addressed the demand, cost, and competitive aspects of converging technologies, including wireless and broadband. He has evaluated pricing policies for increasingly competitive telecommunications markets, including appropriate mechanisms for pricing access services to competitors and studied actual and potential competition for services provided by incumbent telephone operating companies. Most recently, he has analyzed the effects of convergence and growing intermodal competition on whether incumbent firms should be considered dominant in the provision of certain services and the regulatory and antitrust implication of such determinations.



Since the passage of the United States Telecommunications Act, Dr. Tardiff has participated in interconnection arbitrations, unbundled element proceedings, universal service investigation, applications by incumbent local exchange carriers for authorization to provide interLATA long-distance, and implementation of the Triennial Review Order rules for unbundling network elements in over 25 states and before the United States Federal Communications Commission. His international research and consulting experience includes studies and expert reports on telecommunication competition issues in Canada, Japan, New Zealand, Peru, Australia, and Trinidad and Tobago, where he was an economic expert in an interconnection arbitration between two wireless carriers.

## Education

- Ph.D., Social Sciences, University of California, Irvine, CA
- B.S., Mathematics, California Institute of Technology, Pasadena, CA

## Testimony experience

- Comments of Dr. Timothy J. Tardiff on broadband Internet access competition and whether to retain *ex ante* rules based on common carrier regulation, prepared for filing with the Federal Communications Commission, WC Docket No. 17-198, July 17, 2017.
- Deposition Testimony, Susan Mojica and Thomas Mojica, Individually and on behalf of others similarly situated v. Securus Technologies, Inc., Civil Action No. 5:14-cv-5258-TLB, U.S. District Court for the Western District of Arkansas, May 31, 2017.
- Expert Report, Susan Mojica and Thomas Mojica, Individually and on behalf of others similarly situated v. Securus Technologies, Inc., Civil Action No. 5:14-cv-5258-TLB, U.S. District Court for the Western District of Arkansas, April 26 and May 16, 2017.
- Deposition Testimony, Virginia Electric and Power Company d/b/a Dominion Virginia Power v. Verizon Virginia LLC and Verizon South Inc., Case No. CL15-3029-00, Virginia: In the Circuit Court of the County of Henrico, March 10, 2017.
- Expert Report, Walter Chruby, et al. v. Global Tel\*Link Corporation, Civil Action No. 5:15-cv-05136-TLB, U.S. District Court for the Western District of Arkansas, February 16, 2016.
- Expert Rebuttal Report, Global Tel\*Link Corporation ICS Litigation, Civil Action No. 5:14-cv-5275-TLB, U.S. District Court for the Western District of Arkansas, October 20, 2016.
- Expert Rebuttal Report, Susan Mojica, Individually and on behalf of others similarly situated v. Securus Technologies, Inc., Civil Action No. 5:14-cv-5258-TLB, U.S. District Court for the Western District of Arkansas, October 7, 2016.
- Deposition Testimony, Global Tel\*Link Corporation ICS Litigation, Civil Action No. 5:14-cv-5275-TLB, U.S. District Court for the Western District of Arkansas, August 9, 2016.



- Deposition Testimony, Susan Mojica, Individually and on behalf of others similarly situated v. Securus Technologies, Inc., Civil Action No. 5:14-cv-5258-TLB, U.S. District Court for the Western District of Arkansas, July 12, 2016 and August 30, 2016.
- Expert Report, Susan Mojica, Individually and on behalf of others similarly situated v. Securus Technologies, Inc., Civil Action No. 5:14-cv-5258-TLB, U.S. District Court for the Western District of Arkansas, June 10, 2016.
- Expert Report, Global Tel\*Link Corporation ICS Litigation, Civil Action No. 5:14-cv-5275-TLB, U.S. District Court for the Western District of Arkansas, June 9, 2016.
- Reply Affidavit of Timothy J. Tardiff on the economic evaluation of the monetary value of possible joint use agreement advantages, prepared for filing with the Federal Communications Commission on behalf of Verizon Virginia and Verizon South, Verizon Virginia LLC and Verizon South, Inc., Complainant v. Virginia Electric and Power and Light Company dba Virginia Dominion Power, Respondent, Docket No. 15-190, File No. EB-15-MD-006, February 9, 2016.
- Reply Affidavit of Timothy J. Tardiff on the economic evaluation of the monetary value of possible joint use agreement advantages, prepared for filing with the Federal Communications Commission on behalf of Verizon Florida, Verizon Florida LLC, Complainant v. Florida Power and Light Company, Respondent, Docket No. 15-73, File No. EB-15-MD-002, November 24, 2015.
- Affidavit of Timothy J. Tardiff on the economic evaluation of the monetary value of possible joint use agreement advantages, prepared for filing with the Federal Communications Commission on behalf of Verizon Virginia and Verizon South, Verizon Virginia LLC and Verizon South, Inc., Complainant v. Virginia Electric and Power and Light Company dba Virginia Dominion Power, Respondent, Docket No. 15-190, File No. EB-15-MD-006, August 3, 2015.
- Affidavit of Timothy J. Tardiff on the economic evaluation of the monetary value of possible joint use agreement advantages, prepared for filing with the Federal Communications Commission on behalf of Verizon Florida, Verizon Florida LLC, Complainant v. Florida Power and Light Company, Respondent, Docket No. 15-73, File No. EB-15-MD-002, March 13, 2015.
- Reply Affidavit of Timothy J. Tardiff on presumptive just and reasonable rates for pole attachments, prepared for filing with the Federal Communications Commission on behalf of Frontier Communications, Commonwealth Telephone Company d/b/a Frontier Communications Commonwealth Telephone Company and CTSI, LLC d/b/a Frontier Communications CTSI Company, LLC, Complainants v. UGI Utilities – Electric Division, Respondent, File No. EB-14-MD-007, September 15, 2014.
- Reply Affidavit of Timothy J. Tardiff on presumptive just and reasonable rates for pole attachments, prepared for filing with the Federal Communications Commission on behalf of Frontier Communications, Commonwealth Telephone Company LLC d/b/a Frontier Communications Commonwealth Telephone Company, Frontier Communications of

Breezewood, LLC, Citizens Telecommunications Company of West Virginia d/b/a Frontier Communications Company of West Virginia, and Frontier West Virginia Inc., Complainants, v. Metropolitan Edison Company, Pennsylvania Electric Company, West Penn Power Company d/b/a Allegheny Power, Monongahela Power Company, and the Potomac Edison Company, Respondents, File No. EB-14-MD-008, July 31, 2014.

- Supplemental Expert Report, Duke Energy Carolinas, LLC, Plaintiff v. Frontier Communications of the Carolinas LLC, Defendant, 2:13-cv-00040-MR-DLH, U.S. District Court for the Western District of North Carolina, June 27, 2014.
- Deposition Testimony, Florida Power & Light Company, Plaintiff v. Verizon Florida LLC, Defendant, Case No. 13-014808-CA-01, Circuit Court of the Eleventh Judicial District in and for Miami-Dade County, Florida, June 24, 2014.
- Affidavit of Timothy J. Tardiff on presumptive just and reasonable rates for pole attachments, prepared for filing with the Federal Communications Commission on behalf of Frontier Communications, Commonwealth Telephone Company LLC d/b/a Frontier Communications Commonwealth Telephone Company, Frontier Communications of Breezewood, LLC, Citizens Telecommunications Company of West Virginia d/b/a Frontier Communications Company of West Virginia, and Frontier West Virginia Inc., Complainants, v. Metropolitan Edison Company, Pennsylvania Electric Company, West Penn Power Company d/b/a Allegheny Power, Monongahela Power Company, and the Potomac Edison Company, Respondents, File No. EB-14-MD-008, June 11, 2014.
- Expert Report, Florida Power & Light Company, Plaintiff v. Verizon Florida LLC, Defendant, Case No. 13-014808-CA-01, Circuit Court of the Eleventh Judicial District in and for Miami-Dade County, Florida, May 15, 2014.
- Affidavit of Timothy J. Tardiff on presumptive just and reasonable rates for pole attachments, prepared for filing with the Federal Communications Commission on behalf of Frontier Communications, Commonwealth Telephone Company d/b/a Frontier Communications Commonwealth Telephone Company and CTSI, LLC d/b/a Frontier Communications CTSI Company, LLC, Complainants v. UGI Utilities – Electric Division, Respondent, File No. EB-14-MD-007, May 14, 2014.
- Expert Report, Duke Energy Carolinas, LLC, Plaintiff v. Frontier Communications of the Carolinas LLC, Defendant, 2:13-cv-00040-MR-DLH, U.S. District Court for the Western District of North Carolina, April 1, 2014.
- Reply Affidavit of Timothy J. Tardiff on presumptive just and reasonable rates for pole attachments, prepared for filing with the Federal Communications Commission on behalf of Frontier Communications of the Carolinas, Frontier Communications of the Carolinas, LLC, Complainant v. Duke Energy Carolinas, LLC, Defendant, File No. File No. EB-14-MD-002, March 20, 2014.
- Reply Affidavit of Timothy J. Tardiff on presumptive just and reasonable rates for pole attachments, prepared for filing with the Federal Communications Commission on behalf of Frontier Communications of the Carolinas, Frontier Communications of the Carolinas, LLC,

Complainant v. Duke Energy Carolinas, LLC, Defendant, File No. File No. EB-14-MD-001, March 18, 2014.

- Expert Report, Tampa Electric Company, Plaintiff v. Verizon Florida LLC, Defendant, Civil Action No. 12-016349, Circuit Court, Hillsborough County, Florida, Civil Division, February 24, 2014.
- Reply Affidavit of Timothy J. Tardiff on presumptive just and reasonable rates for pole attachments, prepared for filing with the Federal Communications Commission on behalf of Frontier Communications of the Carolinas, Frontier Communications of the Carolinas, LLC, Complainant v. Duke Energy Progress, Inc., Defendant, File No. EB-13-MD-007, February 11, 2014.
- Affidavit of Timothy J. Tardiff on presumptive just and reasonable rates for pole attachments, prepared for filing with the Federal Communications Commission on behalf of Frontier Communications of the Carolinas, Frontier Communications of the Carolinas, LLC, Complainant v. Duke Energy Carolinas, LLC, Defendant, File No. No. EB-14-MD-002, January 29, 2014.
- Affidavit of Timothy J. Tardiff on presumptive just and reasonable rates for pole attachments, prepared for filing with the Federal Communications Commission on behalf of Frontier Communications of the Carolinas, Frontier Communications of the Carolinas, LLC, Complainant v. Duke Energy Carolinas, LLC, Defendant, File No. File No. EB-14-MD-001, January 17, 2014.
- Affidavit of Timothy J. Tardiff on presumptive just and reasonable rates for pole attachments, prepared for filing with the Federal Communications Commission on behalf of Frontier Communications of the Carolinas, Frontier Communications of the Carolinas, LLC, Complainant v. Duke Energy Progress, Inc., Defendant, File No. EB-13-MD-007, December 9, 2013.
- Deposition Testimony, Tri-County Electric Cooperative, Inc., Plaintiff v. GTE Southwest d/b/a Verizon Southwest, Defendant, Cause No. CV-10-1865, District Court, Parker County, Texas, 43<sup>rd</sup> Judicial District, September 11, 2013.
- Expert Rebuttal Report, Tri-County Electric Cooperative, Inc., Plaintiff v. GTE Southwest d/b/a Verizon Southwest, Defendant, Cause No. CV-10-1865, District Court, Parker County, Texas, 43<sup>rd</sup> Judicial District, August 30, 2013.
- Expert Report, Tri-County Electric Cooperative, Inc., Plaintiff v. GTE Southwest d/b/a Verizon Southwest, Defendant, Cause No. CV-10-1865, District Court, Parker County, Texas, 43<sup>rd</sup> Judicial District, August 21, 2013.
- Direct Testimony of Timothy J. Tardiff on antitrust and community impacts, prepared for filing with the Montana Commissioner of Securities and Insurance on behalf of the Office of the Commissioner of Securities and Insurance, Case No: INS-2012-238, February 8, 2013.
- Deposition Testimony, Montana Commissioner of Securities and Insurance Case No: INS-2012-238, February 1, 2013.

- Deposition Testimony, Texas Public Utility Commission Docket No. 38389, July 16, 2012.
- Affidavit of Timothy J. Tardiff on presumptive just and reasonable rates for pole attachments, prepared for filing with the Federal Communications Commission on behalf of Frontier West Virginia, Frontier West Virginia, Inc., Complainant v. Appalachian Power and Wheeling Power, Defendants, File No. EB-12-MD-004, , June 22, 2012.
- Rebuttal Testimony of Timothy J. Tardiff on the rate for wholesale services provided to competitive local exchange carriers, prepared for filing with the Texas Public Utility Commission on behalf of AT&T Texas, Docket No. 38389, May 11, 2012.
- Affidavit of Timothy J. Tardiff on statistical sampling issues, on behalf of Albert Pecherek, M.D., Medicare Appeal Number: 1-691874218, ALJ Appeal No. 1-750870135, September 16, 2011.
- Expert Report, Qwest Communications Corporation, Complainant v. Farmers and Merchants Telephone Company, Defendant, File No. EB-07-MD-001, Federal Communications Commission, November 30, 2010.
- Affidavit of Timothy J. Tardiff on the reasonableness of dominant carrier regulation for fixed line services, Telecommunications Services of Trinidad and Tobago, Claimant and Telecommunications Authority of Trinidad and Tobago, Defendant, Claim No. CV2010-02389, High Court of Justice, Republic of Trinidad and Tobago, September 29, 2010.
- “The Economics of Access Stimulation: Economic Evaluation of the ‘Fact Report’ by Drs. Alan Pearce and W. Brian Barrett,” ex parte filing with the Federal Communications Commission on behalf of Qwest Communications International, WC Docket No. 07-135, August 5, 2010.
- Statement of Timothy Tardiff on the regulation of retail local telephone services, prepared for filing with the Commonwealth Public Utilities Commission, Commonwealth of the Northern Mariana Islands on behalf of the Micronesian Telecommunications Corporation, CPUC Docket No.09-3, July 30, 2010.
- Reply Declaration of Timothy J. Tardiff and Dennis L. Weisman on an analytical framework for evaluating the competitiveness of special access services, prepared for filing with the Federal Communications Commission on behalf of Qwest Communications International, WC Docket No. 05-25, RM-10593, February 24, 2010.
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- Tardiff, T.J., "Regional Bell Operating Company InterLATA Entry and the Public Interest," Presented at the 25th Annual Rate Symposium, St. Louis, Missouri, April 26, 1999.
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- Participant in AGT International Symposium on Local Interconnection Policy, Emerald Lake, British Columbia, Canada, May 27-28, 1994.
- Tardiff, T.J., "Access Charges and Toll Prices in the United States: An Economic Evaluation," Presented to representatives of Japanese Long-Distance Companies, New York, New York, May 16, 1994.
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- Tardiff, T.J., "A Note on Goodness of Fit Statistics for Probit and Logit Models." Transportation 5: 377-388, 1976.
- Tardiff, T.J., "The Effects of Socioeconomic Status on Transportation Attitudes and Behavior." Ph.D. Dissertation, School of Social Science, University of California, Irvine, 1974.

### **Professional associations**

- Member, American Economic Association
- Associate Member, American Bar Association
- Member, Federal Communications Bar Association

### **Fellowships, grants and awards**

- First Place, Dissertation Contest of the Transportation Science Section of the Operations Research Society of America.
- National Science Foundation (NSF) Research Initiation Grant (Engineering Division), 1976-1978.
- NSF Grant for Improving Doctoral Dissertation Research in the Social Sciences, 1973-1974.
- NSF Predoctoral Fellowship, 1972-1974.
- Public Health Service Traineeship, 1971-1972.